UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
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CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

S-6J

DATE: OCT 1 6 2015

SUBJECT: Region 5 Responses to National Remedy Review Board Recommendations for the Matthiessen and Hegeler Zinc Superfund Site, LaSalle County, Illinois

FROM: for Richard C. Karl, Director
Superfund Division, EPA Region 5

TO: Amy R. Legare, Chair
National Remedy Review Board

Thank you for your June 10, 2014, memorandum providing the advisory recommendations of the National Remedy Review Board (the Board) in connection with the Matthiessen and Hegeler Zinc Company site. Each of the Board's advisory recommendations are provided below, followed by Region 5's response.

Site Characterization

The Board notes that the presentation identified potential indoor vapor intrusion risk from trichloroethylene attributed to the Rolling Mill area groundwater hot spot. The Board recommends that, for a currently occupied building, it may be prudent to perform indoor air sampling prior to determining the need to install a vapor mitigation system.

Response:
The Region acknowledges the need for additional investigation regarding the potential for vapor intrusion from trichloroethylene at the Rolling Mill Building. The Region's proposed plan did not require the installation of a mitigation system. Additional vapor intrusion investigation work will occur during the remedial design phase and will include indoor air sampling to determine whether a mitigation system is necessary. If vapor mitigation is determined to be necessary, Region 5 will develop a separate decision document to address that requirement.

Institutional Controls

Based on the information presented to the Board, the Region's preferred alternative for groundwater in OUs 1 and 2, and for soils in the North Area, would be an IC-only approach. In addition, the Region's package indicates that there may be an unacceptable non-cancer risk to future residents and commercial/industrial/construction workers exposed to soil contamination in

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the North Area. The Board notes that the NCP's expectations disfavor IC-only remedies unless there are no practicable alternatives. The Board also notes that existing CERCLA guidance documents (e.g., Office of Solid Waste and Emergency Response (OSWER) Directive No. 9355.0-89, December 2012, *A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls as* [sic] *Contaminated Sites*, and OSWER Directive No. 9355.7-04, May 1995, *Land Use in the CERCLA Remedy Selection Process*) discuss the role of ICs as part of active remedies and address consideration of current and reasonably anticipated future land use. The Board recommends that the Region's decision documents explain how its approach is consistent with the NCP and existing CERCLA guidance.

Response:
Based on the Board's advisory recommendations, an IC-only approach is no longer the preferred alternative for any area of the site. As noted below, the proposed remedy does not remediate groundwater. The State has classified the groundwater at the site as Class II General Resource (i.e., non-potable) groundwater, and the exceedances of the Class II standards at the site do not warrant CERCLA action. As a result, an IC-only remedy for groundwater is no longer under consideration. Also, the Region now recommends that contaminated soils in the North Area be excavated to meet commercial/industrial cleanup standards, with the excavated soils placed within the on-site containment unit. The cost to implement this remedy for the North Area is approximately $20 million. ICs in the form of zoning restrictions (commercial/industrial) would complement the active remedy components for the North Area, since future residential use is not a reasonably anticipated land use for that portion of the site.

Human Health Risk

The presentation to the Board identified that the residential exposure scenario included an exposure frequency of approximately 275 days per year. The Region noted site-specific information such as snow cover was used to develop the value. The Board notes that this site-specific value is less than the recommended default value of 350 days per year for residential exposure frequency (OSWER Directive No. 9285.6-03, March 1991, *Risk Assessment Guidance For Superfund, Volume I, Supplemental Guidance*, "Standard Default Exposure Values"), and it is unclear how future precipitation changes might affect this site-specific value. The Board recommends that the Region clearly explain in the decision documents how this evaluation, using a lower exposure frequency than the recommended default value, is protective of human health for a remedy that would allow for unlimited use and unrestricted exposure without the need for ICs.

Response:
The residential exposure frequency (EF) of 275 instead of the default 350 days per year was used for the dermal contact and inhalation exposure pathways based on site-specific conditions; i.e., 365 days per year minus 90 days per year – the average number of days in the site area with temperatures less than 32 degrees Fahrenheit. This reflects the influence of frozen ground surfaces and snow cover, which reduces the likelihood and extent of dermal contact with soil and reduces the generation of fugitive dusts and associated inhalation. This approach is consistent with Section 6.4 of "Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A)" (RAGS). The incidental ingestion of soil and ingestion of

homegrown produce exposure pathways were evaluated using the default residential EF of 350 days per year, also appropriate for site-specific conditions. The collective risk analysis using these exposure factors is conservative, consistent with RAGS, and will assure adequate public health protection.

Future precipitation changes (and also temperature) are possible. Even using complex meteorological models, it is not possible to accurately determine future precipitation and temperature changes at the site or in the Midwest. Currently the Midwest experiences all 4 seasons, and the use of 90 days to represent winter conditions is appropriate and is protective. Since the remedial action will result in hazardous substances, pollutants, or contaminants remaining in certain areas of the site above levels that allow for unlimited use and unrestricted exposure, reviews of the remedy protectiveness will be conducted every five years. The five-year reviews will evaluate whether the meteorological conditions at the site have changed significantly and whether the assumption of 90 days of winter, with frozen ground conditions and/or snow cover, remains valid.

Ecological Risk

The materials presented to the Board did not contain any ecological risk-based PRGs even though the site has ecologically relevant areas and/or ecological use. The Board recommends, consistent with the remedy selection threshold criteria, that the Region clearly explain in the decision documents how its preferred approach would be protective of human health and the environment. Typically, this may be accomplished in the decision documents by either documenting that the site areas do not pose any ecological risks or by presenting how the selected remedy obtains ecological protectiveness by meeting ecologically based remediation goals.

Response:
Ecological risk-based PRGs were not developed for OU1 because the baseline ecological risk assessment (BERA) concluded that the site is not significantly adversely affecting the overall health of the ecological community of the Little Vermilion River (LVR), the only ecologically relevant area at OU1. Risk-based PRGs for ecological receptors were developed for the three main habitats in OU2 (the areas designated as "Disturbed with Vegetation," "Savannah" and "Oak-Hickory Woodland"), but subsequent analysis indicates that ecologically-based remediation of these areas is not appropriate. The PRGs that were developed for these three areas are available in Appendix S5 and Appendix RA of the RI Report.

The future land use for the areas identified as "Disturbed with Vegetation" and "Savannah" is assumed to be commercial and industrial. These areas are currently part of the former industrial area. Conversations with the former city manager indicate the city intends to continue the commercial/industrial zoning for this portion of the site into the future, therefore application of the ecologically-based PRGs is not appropriate for these areas. The Oak-Hickory Woodlands adjacent to the LVR is the site area with the highest-quality ecological habitat. A September 24, 2013, technical memorandum presents a weight-of-evidence evaluation of the BERA results for this area. The memorandum concluded that the Oak-Hickory Woodland habitat adjacent to the LVR appears to be stable and viable; the community does not appear significantly impacted by

elevated metal concentrations in the soils. This is likely a consequence of the pyroclastic matrix in which the metals reside, limiting the bioavailability of those metals in the soil matrix. The most likely remedial action to achieve the ecological PRGs would be removal of the upper layer of soils within this area. This could be accomplished only by removing a significant amount of vegetation, which would significantly destabilize the soil, increase the potential for erosion, and pose a threat to the LVR from surface water runoff. Based on these considerations, the Region concluded that the Oak-Hickory Woodland would not benefit from remedial actions at this time. Therefore, Region 5 recommends that ecological PRGs not be established for the Oak-Hickory Woodland area, and that this area be allowed to continue its recovery without active cleanup actions. This will be clearly explained in the site decision documents.

Remedial Action Objectives/Preliminary Remediation Goals

[Note: The Region's response to each part of this multi-part comment immediately follows each individual portion of the comment.]

Based on the information provided to the Board, it appears that the Region has decided that the exceedances of the State's Class II General Resource (*i.e.*, non-potable) groundwater standards warrant the use of CERCLA response authority. The Board recommends that the Region explain in its decision documents how its approach to groundwater cleanup at this site is consistent with the NCP and existing CERCLA guidance documents (e.g., OSWER Directive No. 9355.3-01, October 1988, *Guidance for Conducting Remedial Investigations and Feasibility Studies* and OSWER Directive No. 9200.1-23P, July 1999, *Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*). For example, the decision documents should discuss how RAOs were developed for groundwater for this Class II aquifer (i.e., explain how the site's groundwater is being restored to its beneficial use) and how it analyzed a full range of alternatives (e.g., active remediation options beyond an IC-only approach), and how its preferred approach is consistent with the NCP's expectations, including 40 CFR 300.430(a)(1)(iii)(D)].

Response:
Based on the Board's input, the Region re-evaluated its approach regarding groundwater at the site. As a result, there are no longer any groundwater RAOs and there is no proposed remedy for groundwater (including no requirement for ICs). Groundwater at the site is classified by the State as Class II General Resource (i.e., non-potable) groundwater. While there are exceedances of the State's Class II standards, Region 5 believes that those exceedances do not warrant the use of CERCLA response authority. There are no groundwater supply wells at the site and groundwater is not used for potable or industrial uses, including irrigation. Further, a City of LaSalle ordinance, in conjunction with a Memorandum of Understanding between the City of LaSalle and Illinois EPA, legally prohibits the drilling of water wells throughout the City of LaSalle for the purpose of obtaining a water supply. For all of the reasons listed above, potable use of groundwater is an incomplete exposure pathway under current and reasonably foreseeable future conditions, and further, potable use of the groundwater is not considered appropriate. While a groundwater remedial action will not be proposed, the proposed site remedy includes groundwater monitoring.

In the package provided to the Board, a proposed OU1 RAO includes language to reduce surface water run-off from on-site soils into the Little Vermilion River "to the extent practicable." It appears to the Board that the remedial alternatives considered would not require the caveat "to the extent practicable." The Board recommends that the decision documents clearly explain any potential limitations on the practicability of the remedies evaluated for addressing the slag.

Response:
The Region agrees that "to the extent practicable" should be removed from the RAO relating to run-off from the Slag Pile. The Region has also clarified the RAO. The RAO is primarily intended to prevent surface water runoff and erosion that would serve to uncover contaminated materials at the Slag Pile Area and make them available to potential receptors at the Slag Pile Area. As a result, the Region has removed the phrases "into the LVR" and "to the extent practicable" from the RAO. The revised RAO is now worded as follows:

- *"Reduce surface water runoff and erosion of material from the Slag Pile slope to prevent any unacceptable risks to any current or future human or ecological receptors."*

The Region's package provided to the Board included several proposed on-site actions that include capping as a remedial component. The proposed RAOs for addressing on-site soils do not include protection of groundwater. Yet the package includes details for a low-permeability cap that would be protective of groundwater by mitigating leaching surface water through the contaminated soil. The Board recommends that the Region consider, consistent with potential Applicable or Relevant and Appropriate Requirements, a less restrictive "cover" approach that may be less expensive and allow for more flexibility during design.

Response:
The Region agrees that a low-permeability cap is not necessary to achieve the proposed RAOs and that a soil cover would meet potential ARARs. The FS has been revised to reflect a soil cover instead of a low-permeability cap to address on-site soils. This change will also be reflected in the site decision documents.

In the package presented to the Board, preliminary remediation goals (PRGs) for OU2 residential properties appear to be based on a hazard quotient of 1 or an excess lifetime cancer risk of 10^{-4}, since PRG concentrations associated with a 10^{-6} and a 10^{-5} excess lifetime cancer risk are below background levels (arsenic background is 11.8 parts per million). Consistent with the NCP at 40 CFR 300.430(e) and EPA guidance, "*Rules of Thumb for Superfund Remedy Selection*" (EPA 540-R-97-013, August 1997), PRGs for carcinogenic chemicals generally should be set at concentrations that achieve 10^{-6} risk. In addition, EPA generally does not remediate below background levels (see e.g., *Rules of Thumb*, 1997; OSWER 9285.6-07P, May 2002, *Role of Background in the CERCLA Cleanup Program*). The Board recommends that the Region explain in the decision document how its approach for setting PRGs is consistent with CERCLA policy. The Board also recommends that the Region review the PRGs to ensure that the process to identify these goals is consistent with the NCP and EPA policy regarding risk levels and background.

Response:
The Region evaluated a range of potential arsenic PRGs for the OU2 residential properties, including PRGs based on excess lifetime cancer risk (ELCR) levels of 10^{-6}, 10^{-5}, and 10^{-4}, a hazard index (HI) of 1, and site-specific background concentrations. The potential PRGs for arsenic in soil are presented in the following table, in the order of increasing risk from left to right.

Chemical of Concern & Exposure Pathway	*Target ELCR = 10^{-6}*	*Target ELCR = 10^{-5}*	*Site-Specific Background*	*Target HI = 1*	*Target ELCR = 10^{-4}*
Arsenic - Combined	*0.23 mg/kg*	*2.3 mg/kg*	*11.8 mg/kg*	*18 mg/kg*[1]	*23 mg/kg*

Arsenic PRGs based on risk levels of 10^{-6} and 10^{-5} are below background and not achievable. An arsenic PRG based on an HI of 1 is lower (and therefore more protective) than a PRG based on a risk level of 10^{-4}, while a PRG based on site-specific background is even lower (and more protective). The risk levels associated with PRGs based on site-specific background (11.8 mg/kg) and an HI of 1 (18 mg/kg) are 5E-05 and 8E-05, respectively. Both are within the 10^{-5} to 10^{-4} risk range, and the difference between their risk estimates is minimal. After evaluating the cleanup alternatives against the primary balancing criteria specified in the NCP, and considering the need to make a statutory cost-effectiveness finding, the Region made the risk management decision to propose an arsenic PRG of 18 mg/kg[1]. This decision considered long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, short-term effectiveness, implementability, and cost. The Region concluded that the $10 million cost increase associated with a PRG based on background – which would require the cleanup of approximately 40,000 additional cubic yards of soil – compared to a PRG based on an HI of 1, is significant, and would result in limited risk reduction. The Region will ensure that the site decision documents explain how its approach for establishing PRGs is consistent with CERCLA policy and the NCP.

The Board notes that the presentation and review materials utilized the phrase "remedial action levels." The Board recommends that, consistent with the NCP and existing CERCLA guidance (e.g., 1999 ROD guidance, footnote 23), the decision documents be written in terms of PRGs and cleanup levels.

Response:
The Region agrees. Site decision documents will be written in terms of "PRGs" and "cleanup levels" instead of "remedial action levels."

Remedy Performance

Based on information provided to the Board, the Region is recommending a very large-scale cleanup for residential properties. Because of the large number of properties needed to be investigated and cleaned up under the Region's preferred approach, and the length of time that

[1] *The package presented to the Board indicated that the Region was proposing an arsenic PRG of 23 mg/kg, based on a risk level of 10^{-4}. In the FS, the potential PRG based on an HI of 1 was actually based on an HI of 1.49 (rounded to 1), with the resulting soil concentration being higher than 23 mg/kg. The Region has since re-evaluated that approach and recalculated the PRG based on an HI of 1 (with no rounding), with the resulting soil concentration for that potential PRG being 18 mg/kg.*

would be required before all the properties can be addressed, the Board recommends that the decision documents clearly explain how the properties' investigation and cleanup might be prioritized. In developing a phased approach for the residential cleanup activities, prioritization might be made for: addressing properties with higher concentrations first, where sensitive receptors (e.g., children or pregnant women) are present, or where children with elevated blood lead levels are present. The Board further recommends that the Region develop a community outreach effort for the residential study area to help inform the community about potential steps that may be taken to protect themselves in the interim, before the remedy can be fully implemented. The Board also recommends that the Region consider adding an indoor dust assessment component to residential sampling collected during remedial design.

Response:
The Region agrees that a phased approach should be used during large-scale residential cleanups such as the residential cleanup anticipated at this site. The site decision documents will clearly explain how the properties' investigation and cleanup might be/will be prioritized, including prioritizing properties based upon levels of contamination and sensitive receptors. The Region intends to develop and conduct a community outreach effort to provide information to the community about steps they can take to protect themselves until the remedy is fully implemented. The Region also will consider adding an indoor dust assessment component during remedial design sampling.

Alternative Remedy

Based on information provided to the Board, it appears that arsenic in soil poses a human health risk at this site. The Board recommends that the Region consider the use of phytoremediation using Chinese fern for arsenic removal from soil as part of the remedial action (in addition to ICs) for the North Area in OU2 and groundwater in OU1. The Chinese fern, an arsenic hyperaccumulator, has shown effective removal of soil arsenic in both lab and field studies using varying environmental conditions. This approach may help decrease soil arsenic at this site to levels below the 18.15 mg/kg PRG in several years since several cuttings of the plant materials can be harvested each year. The Board also recommends that the Region evaluate proper disposal of the arsenic-bearing plant materials.

Response:
During the FS, the Region preliminarily evaluated the use of the Chinese Brake Fern (CBF) and, although it shows promising results in the uptake of arsenic, the Region does not believe its use is appropriate at the site. Studies have indicated a difficulty in growing the fern in cold climates. The typical distribution of the CBF is mostly in warm and tropical regions, such as the southern U.S. and California. Further, although the CBF is effective for phytoremediation of arsenic-contaminated soil, the site also has lead soil contamination for which the CBF is not effective.

Region 5 is not proposing a remedy for groundwater, so there is no need to evaluate the use of any treatment options, such as CBF, for groundwater.

Costs

In the package presented to the Board, the estimated cleanup cost per residential property is approximately $44,000. This estimate appears high since, under the Region's preferred approach, the excavated soils would be disposed of on-site and not at an off-site facility. Typically disposal cost/fees represent a big part of residential cleanup costs. Also, considering that a large number of properties may be cleaned up, costs per unit should be further reduced due to economies of scale. The Board recommends that the cleanup costs for the residential properties be re-evaluated and presented in the decision documents.

Response:
In general, FS cost estimates are conservative. The cost estimates for all evaluated alternatives at the site were similarly calculated and therefore serve the purpose of relative comparison among the alternatives. There are a significant number of unknowns associated with remediation of the residential area, therefore a conservation cost estimate is appropriate.

Further, although the recommended alternative may have a conservative cost estimate, it is recommended for selection and considered cost-effective. There is no other remedy evaluated that is better suited to address the residential contamination. If the implemented remedy costs less than the FS cost estimate, the alternative will still be considered cost-effective and appropriate for selection.

Comprehensive Environmental Response, Compensation and Liability Act Authority

In the material presented to the Board, the Region stated that slag pile-area risks are limited to human health direct contact based upon manganese exposure. The Board recognizes the physical hazards associated with the current condition of the slag pile, including unstable steep slopes that may erode, or are eroding, into the river. While potential adverse impacts on the river are important, it was unclear to the Board whether the use of CERCLA authority for slag remediation to reduce these risks is warranted. The Board recommends that in the decision documents the Region clearly explain the RAO associated with cleaning up the slag pile and how slag pile remediation is warranted under CERCLA.

Response:
The risk assessment showed that the Slag Pile Area poses an unacceptable risk to human health due to direct contact, ingestion, and inhalation exposure pathways to a variety of metals (with manganese being the primary risk driver). Lead also poses the potential for adverse effects to human receptors through direct contact, ingestion, and inhalation. Remedial action at the Slag Pile Area is therefore warranted under CERCLA to address these human health and ecological risks.

The Region's recommended remedy for the Slag Pile Area is installation of a soil cover. In order to install the soil cover and have it remain in place for long-term protection of human health and the environment, the slope of the slag pile must be reduced. Reduction of the side slopes will reduce surface water runoff and erosion which could uncover contaminated materials and make them available to receptors at the Slag Pile Area. The recommended remedy for the Slag Pile

Area therefore addresses the two OU1 Soil RAOs associated with the Slag Pile Area. Implementation of the recommended remedy would have the additional benefit of reducing the physical hazards associated with the current condition of the slag pile, but this is not the purpose of the reduction of the slag pile slope.